BIOF 519: Theoretical and Applied Bioinformatics: Genomics and Metagenomics

The objective of this course is to give students an introduction into the theory and practice of a wide range of bioinformatic techniques and applications, enabling them to use these tools in their own research. This course will be divided into five modules: statistical approaches in sequence analysis; phylogenetic analysis of nucleotide and protein sequences; acquisition and analysis of sequence datasets, including EST and RNA-seq data; analysis of genomic datasets from an evolutionary perspective; and, prediction of protein secondary structure. Two or three of the five sessions in each module will be divided roughly 60 percent theoretical lecture and 40 percent learning to use relevant computational tools. The final session of each module will be split between a discussion of computational tools, a journal club, and a discussion of work on a project assigned for each module. By the end of the course, students should be able to acquire many types of sequence data, identify orthologous and paralogous genes, predict domains and motifs, identify alternative splicing, analyze genomic/protein alignments, and make a prediction of secondary protein structure from primary sequence.

This is the second part of a two-part course. The completion of the first part (prerequisite) is required before taking the second part. Registration is required separately for each part of the course.

Learning Objectives

- Introduce the theory and practice of a wide range of bioinformatic techniques and applications, enabling students to use these tools in their own research
- Search Genome Resources at NCBI
- Conduct genome assembly and gene prediction
- Analyze molecular evolution and genome comparison

Credits: 2
Class Type: Graduate Course
Prerequisites:
BIOF 518
The above course(s) or permission from the instructor. Solid understanding of biology, computer science and mathematics.
Program: Bioinformatics and Data Science
Availability Spring 2022
Session Session B